

## 1 Claims

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- 3 1) A cartridge for use in a Surface Plasmon Resonance
- 4 sensor, the cartridge comprising an optical element
- 5 having a first surface and a mounting member for
- 6 supporting a sensing agent located on a second
- 7 surface of the optical element, the first surface
- 8 comprising a first means for directing a beam of
- 9 light incident on the optical element towards the
- 10 second surface at an angle of incidence to the second
- 11 surface that results in substantially total internal
- 12 reflection of the beam of light at an interface of
- 13 the mounting member and the second surface wherein
- 14 the cartridge further comprises a detachable channel
- 15 suitable for containing a fluid sample to be tested.
- 16
- 17 2) A cartridge as claimed in Claim 1 wherein the channel
- 18 locates on the second surface of the cartridge such
- 19 that the fluid sample contained within the channel
- 20 makes physical contact with the sensing agent.
- 21
- 22 3) A cartridge as claimed in Claim 1 or Claim 2 wherein
- 23 the optical element further comprises a third surface
- 24 for the exit of beam of light from the optical
- 25 element wherein the third surface includes a second
- 26 means for directing the beam of light.
- 27
- 28 4) A cartridge as claimed in any of the preceding Claims
- 29 wherein the optical element comprises a material
- 30 having a first dielectric constant while the mounting
- 31 member comprises a material having a second
- 32 dielectric constant wherein the second dielectric
- 33 constant is of an opposite sign to that of the first
- 34 dielectric constant.

- 1
- 2 5) A cartridge as claimed in any of the preceding Claims  
3 wherein the first means for directing the light beam  
4 comprises a focusing element for focusing the beam of  
5 light to a line at the interface of the mounting  
6 member and the second surface.  
7
- 8 6) A cartridge as claimed in any of Claims 3 to 5  
9 wherein the second means for directing the light beam  
10 comprises a defocusing element.  
11
- 12 7) A cartridge as claimed in any of the preceding Claims  
13 wherein the mounting member comprises a metal.  
14
- 15 8) A cartridge as claimed in any of the preceding Claims  
16 wherein the optical element comprises an injection  
17 moulded plastic material.  
18
- 19 9) A cartridge as claimed in any of the preceding Claims  
20 wherein the sensing agent comprises one or more  
21 antibodies each antibody being suitable for binding a  
22 pathogen.  
23
- 24 10) A cartridge as claimed in Claim 9 wherein the bound  
25 pathogen is selected from the group comprising  
26 Legionella, Escherichia coli, Salmonella, Bacillus  
27 Anthracis, Yersinia Pestis, Lysteria,  
28 Cryptosporidium, Variola virus, Picomaviridae  
29 Apthovirus, Filoviruses, any plasticiser, steroid,  
30 medicinal drug or illicit substance or any other  
31 known fluid borne bacterium.  
32

- 1 11) A cartridge as claimed in Claim 9 or Claim 10 wherein  
2 a protein substrate and a ligand is employed to bind  
3 a biotinylated antibody to the metal.  
4
- 5 12) A cartridge as claimed in Claim 11 wherein the  
6 protein substrate comprises biotin.  
7
- 8 13) A cartridge as claimed in Claim 11 or Claim 12  
9 wherein the ligand comprises a protein selected from  
10 the group comprising avidin, strepavidin and  
11 neutravidin.  
12
- 13 14) A Surface Plasmon Resonance sensor comprising a light  
14 source for generating a beam of light, a cartridge as  
15 claimed in any of Claims 1 to 13, and a light beam  
16 detection means wherein the employment of the  
17 cartridge allows for the miniaturisation of the  
18 sensor.  
19
- 20 15) A Surface Plasmon Resonance sensor as claimed in  
21 Claim 14 wherein the light source comprises a diode  
22 laser.  
23
- 24
- 25 16) A Surface Plasmon Resonance sensor as claimed in  
26 Claim 14 or Claim 15 wherein the light beam detection  
27 means comprises a detector and a data processing  
28 means.  
29
- 30 17) A method of field detection of one or more pathogens  
31 that comprising the steps of:  
32 1) Selecting an appropriate cartridge for the  
33 detection of one or more pathogens for use in a  
34 Surface Plasmon Resonance sensor;

- 1        2) Calibrating the Surface Plasmon Resonance sensor;
- 2        and
- 3        3) Testing a fluid sample for the presence of one or
- 4        more of the pathogens;
- 5
- 6    18) A method of field detection of one or more pathogens
- 7        as claimed in Claim 17 wherein the selection of the
- 8        appropriate cartridge comprises locating the
- 9        cartridge with one or more appropriate antibodies for
- 10       binding with the one or more pathogens.
- 11
- 12   19) A method of field detection of one or more pathogens
- 13       as claimed in Claim 17 or Claim 18 wherein
- 14       calibration of the Surface Plasmon Resonance sensor
- 15       comprises:
- 16       1) Irradiating a mounting member with a beam of light
- 17       in the absence of the fluid sample; and
- 18       2) Detecting a component of the beam of light
- 19       reflected from the mounting member and storing the
- 20       data as a reference signal;
- 21
- 22   20) A method of field detection of one or more pathogens
- 23       as claimed in Claim 17 to Claim 19 wherein the
- 24       testing of a fluid sample for the presence of one or
- 25       more pathogens comprises:
- 26       1) Locating the fluid sample with respect to a
- 27       channel;
- 28       2) Connecting the channel to the cartridge;
- 29       3) Irradiating the fluid sample with the beam of
- 30       light;
- 31       4) Detecting the beam of light reflected from the
- 32       mounting member and storing the data as a sample
- 33       signal; and